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Division of Mycology and Disease Survey

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BUREAU OF PLANT INDUSTRY

UNITED STATES DEPARTMENT OF AGRICULTURE

THE PLANT DISEASE REPORTER

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THE PLANT DISEASE SURVEY

DIVISION OF MYCOLOGY AND DISEASE SURVEY

Vol. XX September 15, 1936 Number 16

IN THIS ISSUE

(Note: This is the first number of the Reporter since August 15.)

Reports from various States, page 248, indicate that bacterial wilt of corn was hard to find this year.

Paul R. Miller reports his observations on watermelon diseases in Mississippi, page 255.

A non-parasitic trouble of watermelon is reported from Georgia by the Division of Fruit and Vegetable Crops and Diseases, page 257.

J. D. Wilson contributes a note on the occurrence of vegetable diseases in Ohio this season, page 257.

E. F. Guba states that seed of his leaf-mold resistant tomato hybrids is available for distribution, page 258.

Bacterial canker was prevalent in Maryland tomato fields this year, according to H. A. Hunter, page 259.

Pea mosaic was not very important in New York in 1936, according to A. L. Harrison, page 259.

S. M. Zeller reports the occurrence of peach scab in Oregon this year, page 260.

Mosaic and powdery mildew, especially mosaic, are the chief diseases affecting raspberries in the Hudson Valley of New York, according to L. M. Cooley, page 260.

The occurrence of Verticillium wilt of strawberries is reported from Oregon for the first time, by S. M. Zeller and L. E. Weaver, page 261.

R. O. Magie reports observations on hop diseases in New York in 1936, page 262.

Various plant diseases in Mississippi are reported by Paul R. Miller, page 262.

The status of the Dutch elm disease is summarized by R. P. White, page 263.

Progress of Dutch elm disease eradication is reported on page 267.

August weather, page 267.

Rainfall during summer and early September, page 269.

BACTERIAL WILT OF CORN IN 1936

REPORTS FROM THE VARIOUS STATES

Massachusetts

Yesterday I spent mostly in Hampden County looking for Stewart's disease of corn. During the past month, I have looked for wilt in various parts of the State, from Essex County to Bristol County and westward to the Connecticut Valley, and found the first and only case of it yesterday. It consisted of a uniform distribution of primary infection of around 0.25 to 0.5 percent in a three-acre field of Pearl popcorn in Agawam. No corn was grown there in past years, and the seed was grown locally by a neighbor in 1934.

E. B. Fowler's fields, near Westfield in which the disease was found in 1934 and 1935, including Gill's Early Market in the same site as in 1935, appeared entirely free from wilt. However, the early variety fields had been harvested and the borers were numerous,--so there may have been a very light infection undetected. The Whipple field was in good stage for inspection, but appeared free, as did also his Gill's Early Golden which was being harvested.

The extensive variety test here at the college is just right for primary infection to appear, but it isn't there. Neither did I see a trace of secondary infection in the popcorn. However, the primary infection there was just beginning to show up, the crop being in the pre- and early-tassel stage. (O. C. Boyd, July 24.)

The sweet corn in the variety test at the Branch Experiment Station at Waltham was carefully examined on August 18, and no case of bacterial wilt was found. (N. E. Stevens.)

Connecticut

The condition here as regards bacterial wilt of sweet corn is about the same as last year, practically no wilt. I think it is probably even a little better than last year. We have seen only one field with wilt. That showed only 1 to 5 percent on a susceptible variety. Other fields that I visited a few years ago showed nothing. (G. P. Clinton, July 21.)

New York

Following is information on the corn wilt situation in Nassau County, Long Island. The actual loss to growers from bacterial wilt this year was less than one percent, in contrast to the high percentage loss of last year. The reason for the low percentage loss this year may be due to two factors:

One is that practically all of the corn varieties grown in the county this season were wilt resistant. The early varieties were Sencross and Spancross; the late varieties, Golden Cross and Whipcross.

The other is that last year all the losses from wilt occurred in the Hicksville-East Meadow area. The rest of the county was free from wilt.

The temperature index for last year (1935) was 82.3. Just why the low temperatures were not effective in controlling the wilt in the areas mentioned has not been answered. The temperature index for this year was 84.0. With two successive cold winters, the temperature may have become a factor in decreasing the wilt for this season.

Dr. Poos collected the corn flea beetle, Chaetocnema pulicaria, in the East Meadow area in May, and found six percent of the beetles infected with Aplanobacter stewarti. Since May I have made collections of the beetles, and sent them to Dr. Poos, but I do not have the record of the percentage of infection. The beetles have been abundant on corn this summer.

Miss Elliott gave me permission to mention the results from her plot in the East Meadow area. An early Bantam, very susceptible to wilt, showed 100 percent infection, with 24 percent of the plants severely injured or dead. Golden Cross Bantam, planted on the same date, showed 100 percent infection on August 13, small lesions on the leaves resulting from flea beetle feeding, but only 4.4 percent were severely injured or dead.

The data collected indicates that if extra early or susceptible varieties had been planted at least 24 percent loss may have been experienced, in spite of the low winter temperatures. On the other hand, because the wilt-resistant varieties have been used, only very slight losses occurred this year, for the county as a whole. It will not be possible to compare this summer with former years, as to the amount of wilt, because the potential wilt danger may have been the same, but no wilt losses occurred because of the increased, and at present almost universal, use of wilt resistant sweet corn varieties in Nassau County.

To summarize: The temperature index for last winter was 84.0. The losses from bacterial wilt were less than one percent for the county. The corn flea beetle was abundant, and a high percentage of the corn plants were infected, but no losses occurred, because practically all of the sweet corn varieties grown in the county this year were resistant to wilt. (M. C. Richards, August 24.)

In the Hudson Valley, bacterial wilt was found as far north as Kingston, though there has been no commercial loss in this region since 1933. This year a number of fields of sweet corn were examined, chiefly those on farms which have been visited regularly for the past five years. Wilt was found in only one, which showed about 0.25 percent seriously diseased plants. (N. E. Stevens.)

Pennsylvania

A careful survey was made of gardens in southwestern Pennsylvania in which from 5 to 10 percent of the sweet corn plants were killed by bacterial wilt in 1935 and up to 80 percent were severely injured by the disease. This year there was practically no loss in most gardens, the largest amount being one-third percent badly diseased plants in the earliest planting of sweet corn in a garden west of Greensburg.

The region around Gettysburg has seemed to be particularly favorable to bacterial wilt. In 1934, after the marked reduction in losses further north, early plantings of Golden Bantam showed 40 to 50 percent of the plants killed by the disease (P.D.R. 18:122). In 1935 losses of 5 percent and over were noted. This year (1936) although many of the same fields were examined no case of the disease was found. (Aug. 11, N. E. Stevens.)

Western Maryland

What has been said regarding the Gettysburg area applies to adjacent Maryland. In July 1935, 5 percent of the plants were killed by bacterial wilt in gardens near Monocacy, and north of Frederick. This year careful examination of a large field of Golden Bamtam at Monocacy showed only 0.2 percent plants seriously injured by bacterial wilt. (N. E. Stevens.)

Virginia

During most seasons at Arlington Farm, susceptible varieties of sweet corn are so heavily infected with bacterial wilt that very few marketable ears of corn are produced. Many of the plants are killed by the disease and most of the remaining plants show moderate to heavy infection. Plots of such susceptible varieties appear to be ruined by the

disease. During the 1936 season at Arlington Farm susceptible varieties have made good stands and have produced a fair crop of marketable ears. Early infection was much less abundant than in previous years and as a result the number of plants killed by the disease was comparatively low. There was a decided increase in amount of infection as the season progressed but this infection was limited largely to leaf lesions which did not prevent development of a fair crop of marketable ears. (Charlotte Elliott.) (See P.D.R. 18:122.)

In the vicinity of Blacksburg bacterial wilt of sweet corn seems to be very severe in old home gardens this season. It appeared to me to be more severe than usual on varieties of sweet corn that are considered rather resistant. In my own garden, Golden Cross Bantam seems to be fairly susceptible and if I had not seeded the corn much thicker than I wanted it to stand my yield would have been cut down considerably as a result of a poor stand.

I have never seen flea beetles so severe on sweet corn as they were early this spring. The plants were literally covered and the blades in many cases seemed to be materially injured. In many instances the disease seemed to start on the leaves and travel down into the main part of the stalk, indicating that the infection was spread by the flea beetles.

Mr. M. S. Kipps, of the Agronomy department, has a test consisting of twenty-three varieties of sweet corn on the experimental plots and there is practically no evidence of wilt in any of the varieties. We made counts recently and found only the slightest trace of wilt. The seed came from several different companies and was all grown in 1935. No sweet corn had been grown near this plot in previous years. (S. A. Wingard, August 15.)

Ohio

Bacterial wilt is very scarce this year. I believe the loss for the State as a whole will be less than 0.1 percent. (Roy C. Thomas.)

At Toledo, Ohio, June 27, only two or three infected plants were found in a field of 15 or 16 thousand inbred, hybrid, and open pollinated strains, many of which are very susceptible.

On August 1, I found that the plantings at Toledo showed no more wilt than on my previous trip and on the basis of the entire field I would say that the amount of damage is negligible. Out of about 1800 plants there were only about four which might be suspected of being infected with wilt. I found conditions for growth there very favorable. They have had rains at critical times and on July 28 had 2½ inches. Corn is pollinating well and they should have an excellent crop. (G. M. Smith.)

Michigan

I have made a number of examinations of fields of both sweet corn and field corn this summer and up to the present time have not found any bacterial wilt. During one of the heat waves, July 9 to 18, firing of the corn took place in many fields. At first these symptoms appeared to be those of bacterial wilt. Samples were collected from a number of fields and carefully examined, but we found no bacterial wilt present.

I might add that during the season of 1935 and so far the present year we have not had a single specimen of bacterial wilt sent in to the laboratory. I have inquired from a number of county agricultural agents both last year and this year again and they all report that this disease is not in evidence, at least not sufficiently prevalent to cause the growers to make any inquiries regarding it. (J. H. Muncie, July 29.)

Indiana

In the experimental plantings near Lafayette in a field which has been in corn continuously for fifteen years and in sweet corn for the past five years, there were found on June 29, in one thousand plants of Golden Rod Inbred No. 14, a very susceptible variety, only two infected plants, and in 400 plants of Golden Bantam Inbred #8432, only one diseased plant. Taking this field as a whole, out of 30,000 plants of varieties known to be susceptible, only 20 diseased plants were found on that date. (G. M. Smith.)

In addition to the observations on the experimental and other plantings near Lafayette already recorded, a special field survey was made on home plantings in the Wabash Valley. Three days were given to this work--June 13, July 5, and July 10. On June 13 the work was confined to the region south of Terre Haute. Only a single infection of bacterial wilt was found at this time. One garden about twenty miles south of Terre Haute showed 10 percent infected plants in an early planting of open pollinated Golden Bantam sweet corn.

On July 5, 40 garden patches of sweet corn were studied in the region north of Terre Haute. The disease was found in five. Usually only an occasional plant was diseased, but in one garden near Hillsdale (in the latitude of Indianapolis), a single garden was found which showed 10 percent diseased plants. The average infection for all plantings examined was a little under 2 percent.

On July 10, 18 gardens were examined in the region west of Crawfordsville. Bacterial wilt was found in only two, one case showing 1 percent diseased plants and the other 2 percent diseased plants. (N. E. Stevens.)

Kentucky

I have seen but very little sweet corn this summer, but E. M. Johnson has been in western Kentucky all summer and has seen some in his travels. He has found only one case of wilt--that was in Logan County in the southwestern part of the State.

There is an extensive planting of Bantam Evergreen on the Station farm at Lexington which you did not see when you were here. I have gone over this, but have failed to find any sign of wilt in it, altho wilt is ordinarily very prevalent on the sweet corns of this general size on the Station farm. (W. D. Valleau, August 8.)

SUMMARY

The survey for bacterial wilt of corn conducted at the expense of the Division of Cereal Crops and Diseases, the results of which are incorporated in the foregoing notes has consisted largely this season of a search for plantings of susceptible varieties of corn and for a few diseased plants in such susceptible plantings. In general, it appears that the disease is more likely to be found in sweet corn in home gardens than in large commercial plantings. This may be partly due to the fact that the commercial areas are more likely to be planted to resistant hybrids. On the basis of the seed produced and sold last year (1,200,000 pounds) it is estimated that at least 200,000 acres of Golden Cross Bantam alone was planted in 1936. This is no doubt a decided benefit to the industry but is hardly conducive either to ease or accuracy in a field survey for the distribution of bacterial wilt.

The fact that bacterial wilt is more readily found in early plantings of sweet corn in home gardens than on larger plantings intended for canning may also be due to some extent, in the opinion of Dr. F. W. Poos, to the fact that overwintering adults of Chaetocnema pulicaria, which are known to carry the organism which causes the disease, tend to hunt out the early corn and remain on it. These beetles are therefore more numerous in proportion to the number of corn plants in such small garden early plantings.

Under present circumstances, the danger is that the amount of bacterial wilt will be over-estimated rather than under-estimated. There is always a tendency, after a disease has received considerable publicity, for those not entirely familiar with it to attribute anything causing somewhat similar symptoms to the disease which has been

most discussed. For that reason, reports of disease incidence should be given credit at their face value only if they come from workers who are thoroughly familiar with the disease. The fact seems to be that within the interesting area where it was so common and destructive a few years ago, i. e., Pennsylvania, Ohio, New Jersey, "up State" New York, and New England, bacterial wilt has become so scarce that it is no longer possible to compare one year with another satisfactorily. The incidence of the disease in this region is now so slight that it can safely be reported as only a trace.

In three of the regions from which reports are available this season the contrast with other recent years is great enough to be safely considered significant. Richard's careful and detailed observations would seem to leave no room for doubt that losses from bacterial wilt in Nassau County (Long Island) New York were greater in 1935 than in either 1934 or 1936.

In southwestern Pennsylvania and Western Maryland the incidence of bacterial wilt was decidedly less in 1936 than in 1935.

Most striking of all is the condition at Arlington Farm, Virginia, where after a series of seasons during which bacterial wilt continued with great and apparently undiminished severity, Miss Elliott reports for 1936 a marked reduction in the amount of disease. The change observed in the Potomac Valley in 1936 as compared with 1935 (and earlier years) is much like that observed in regions further north, the Hudson Valley for example, in 1934 as compared with 1933 and 1932. (N. E. Stevens.)

WATERMELON DISEASES IN WATER VALLEY, MISSISSIPPI
ANTHRACNOSE REACHES EPIPHYTOTIC STAGE

Paul R. Miller

About 3,500 acres of watermelons were grown in the region of Water Valley in north central Mississippi this season, from which 655 car loads were shipped. This is approximately two-thirds of the State's total watermelon shipments. Eighty-five percent were of the Cuban Queen variety and the rest Tom Watson and Jumbo. The majority of growers used from 500 to 600 pounds of either 6N-10P-7K, 4-10-7, or 4-8-4 fertilizer per acre. Less than 5 percent treated their seed.

Generally speaking, the weather was unfavorable for watermelon production. The early part of the season was unusually hot and dry, while the latter part continued abnormally hot but with excessive rainfall occurring weekly. The month of May received 2.17 inches of rainfall which was 3.12 below normal, while the mean temperature was 1.8° above normal. June received only 0.60 inches of rainfall which was 3.96 inches below normal, while the temperature was 3.2° above normal. July, however, received 5.34 inches of rainfall which was 1.20 inches above normal and the temperature continued above normal. The shipping season ended the middle of August and the weather conditions during August were similar to those of July.

Rows from 125 fields comprising approximately 1,000 acres were selected at random and surveyed for diseases. In addition several days were spent at the shipping point to obtain information on the amount and cause of culls.

Anthracnose (Colletotrichum lagenarium). An unusual and severe epiphytotic of anthracnose on watermelon occurred in this region. It was unusual in that early in the season the symptoms produced were atypical. Early infection was limited to Cuban Queens. The melons exhibited numerous light green pimples with a yellow cast in the center, and many of them were deformed. The local people attributed these spots to wind-blown sand, but their theory did not seem plausible since in one field observed where the grower had treated half of his seed with 1 to 1000 solution of mercuric-chloride, the melons grown from the treated seed were free of spots, whereas the melons in the other part of the field were severely infected. Moreover, after the frequent rains in July vines in some fields where spotted melons occurred were blighted to the extent that all of them were killed. Some of the melons had spots over the entire surface, even on the side next to the soil. Apparently the seed was the source of infection and infection took place when the melons were small. Melons in fields planted from a large lot of seed obtained from

Georgia were uniformly infected, whereas those grown from home-produced seed or from other sources remained free of the early infection. However, later in the season secondary infection on larger melons caused the usual type of lesions. Field diagnoses of both types were checked by cultures which yielded the anthracnose fungus. The epiphytotic was severe as attested by the fact that about 75 percent of the 3,500 acres had from 5 to 100 percent of the early melons infected, and that of the 655 carloads shipped, about 125 could not be labeled by the inspectors as U. S. quality grades because of the spotted melons. Considering the fact that the price received for these inferior melons was extremely low and also that shipping them probably injured the market for good melons from this region, the loss doubtlessly amounted to several thousand dollars.

In the face of such loss it was surprising that so little interest was displayed by the County Agent, Growers Association officials, buyers and shippers. The farmers, however, showed much concern and repeatedly asked for aid in preventing such a disaster next year.

Wilt (Fusarium niveum) was observed in 45 of the 125 fields, varying in amount from a trace to 95 percent, with a weighted average of about 15 percent. Wilt was more prevalent on Cuban Queens than on the other two varieties mentioned and was definitely associated in some cases with root knot infection (Heterodera marioni).

Gummy stem blight (Mycosphaerella citrullina) was found in a few fields late in the season but apparently the danger was slight.

Stem-end rot (Diplodia sp.). Only an occasional melon which had previously been injured was seen with stem-end rot. The shippers and railroads were fortunate that this disease did not occur to any extent because stem disinfection was not practiced at the shipping point.

Blossom-end rot (Physiological). A type of blossom-end rot similar in effect to tomato blossom-end rot was very prevalent in this region, as well as in other melon areas of Mississippi. So far as is known the cause is physiological--a disturbed water relationship. In some fields with low water holding capacity, 95 percent of the fruits showed this dry puckered blossom-end rot which frequently included half of the total area. This trouble was more abundant on Cuban Queens than on other varieties. (Division of Mycology and Disease Survey.)

A NON-PARASITIC TROUBLE OF WATERMELON IN GEORGIA

Max P. Hardy

The county agent of Lee County, in which our station farm is located, brought in several Cuban Queen watermelons that were not developing normally. The blossom ends were knobby and about one-fourth to one-half inch inside the rind there were different sizes of necrotic areas. Occasionally deeper areas with a water-soaked appearance were found. The necrotic areas do not show externally and do not appear to follow or be directly associated with any of the vascular tissue, being irregular in position and outline. When first developing they appear as water-soaked areas from the diameter of the lead in a lead pencil to about one-half centimeter in diameter. Later these tissues turn brown and shrink so that cavities are formed. A trip to a field near Philema disclosed vines in apparently perfect condition. From all the facts available it appears that this condition, which is affecting from 75 to 95 percent of the melons of the Cuban Queen variety in Lee County, is related to the moisture supply. In view of the fact that other varieties are not similarly affected it would appear that the Cuban Queen variety is peculiarly susceptible to drought injury. It appears likely that heavy fertilizer applications and resultant vigorous vine growth, with sufficient moisture early in the season, but with deficient moisture after the melons had made about half their growth, has resulted in a condition whereby transpiration from the leaves is causing a withdrawal of moisture from the melons to such an extent as to cause the death of certain cells and finally the malformations that make the melons unmarketable. There does not seem to be an authentic report of a previous similar occurrence. (Abstracted from a report of the U. S. Pecan Field Station and Laboratory, Albany, Georgia, June 6, 1936. Division of Fruit and Vegetable Crops and Diseases.)

VEGETABLE DISEASES IN OHIO

J. D. Wilson

Two diseases on tomatoes are of particular interest this summer because of the fact that they are unusual in this State. Bacterial canker, Aplanobacter michiganense, appeared in several fields in the Lake Erie section this summer. In most cases it was possible to trace the disease back to certain lots of seed. Buckeye rot, Phytophthora parasitica (P. terrestris), occurred rather severely in at least one field in northern Ohio. It seems likely that the disease was soil-borne, since the grower states that he has observed the same trouble on

his farm the past two or three years. The disease appears on staked tomatoes as well as those on the ground."

Other tomato troubles which have been fairly common this year are blossom-end rot, Septoria blight, S. lycopersici, and early blight, Alternaria solani. Leaf mold, Cladosporium fulvum, has persisted in several fields which were planted in proximity to greenhouses in which this disease was present in the spring. Cucumber mosaic (virus) has caused considerable loss in northern Ohio this summer and bacterial wilt, Bacillus tracheiphilus, was of average severity.

The Cercospora and Macrosporium blights of carrot, C. apii carotae and M. carotae, are beginning to appear (September 1) in rather severe form in many carrot fields in northern Ohio. The bacterial blights of bean have not caused as much loss as usual this year. Verticillium wilt of egg plant has been observed in several fields in the Lake Erie section during the past month.

Early and late blights, Cercospora apii and Septoria spp., of celery have been of average severity but not as common as last year. Celery yellows, Fusarium apii, is becoming increasingly prevalent in Ohio fields and considerable loss has been observed, both this year and last, on some of the late varieties like Pascal. (Ohio Agricultural Experiment Station, August 31.)

TOMATOES RESISTANT TO CLADOSPORIUM LEAF MOLD

E. F. Guba

Tomato hybrids resistant to Cladosporium leaf mold, C. fulvum, and developed by the writer, now show sufficient merit to warrant release of seed of the most promising selections to interested experiment station workers in the United States for trial and report. For the present, only seed of red fruited tomatoes is offered.

There has been developed in the progenies of these hybrids both resistance to the leaf mold fungus and desirable fruit size for greenhouse growing and outside trellis. The particular direction in which these tomatoes should be further developed for market and for use in other sections of the country seems to be a problem for the local investigator, not the originator. The ever-increasing number of new varieties of tomatoes suggests the futility of attempting to produce in one locality varieties suitable for many different situations and conditions.

The distribution of seed at this time has been decided on for several reasons, mainly: (1) recognition of the importance of the

disease as a serious loss factor in the greenhouse tomato industry, (2) the admission that perfecting quality in tomatoes for particular regional markets where both weather and soil conditions are factors influencing successful yield and quality is a local problem, (3) a desire to learn of the reaction of the present selections to the Cladosporium leaf-mold disease and their adaptation in other geographical areas in the United States.

All communications should be addressed to Dr. E. F. Guba, Plant Pathologist, Field Station, Massachusetts State College, Waltham, Massachusetts.

BACTERIAL CANKER OF TOMATO PREVALENT IN MARYLAND

A mimeographed leaflet issued by the University of Maryland extension service states that according to Herman A. Hunter, specialist in canning crops, bacterial canker (Aplanobacter michiganense) was prevalent this season in a number of Maryland tomato fields. The disease is relatively new in this area.

THE PEA MOSAIC SITUATION IN NEW YORK STATE IN 1936

A. L. Harrison

A survey that covered parts of six counties (Orleans, Genesee, Ontario, Cayuga, Wayne and Seneca) in central and western New York State was made to ascertain the severity of mosaic in 1936. In addition to this survey, information was obtained from other individuals who had covered many other parts of the State.

In general, the disease was not of much consequence to the pea canning industry of the State in 1936. Only occasional plants infected with mosaic could be found in the early varieties such as Alaska, Surprize, Wisconsin Early Sweet, and the late varieties of the Perfection type. Mosaic was more general in varieties of the Thomas Laxton, Alderman and Telephone types, but even in these the malady was only of consequence in occasional fields.

The mildness of the attack of mosaic in 1936 was a marked contrast to its severity in 1935, when a great many fields of the susceptible varieties were not harvested because of the disease. The plants were so greatly stunted, and the few pods that were formed were so misshapen, crooked, and rough, that the crop would not cover harvesting costs.

Some canneries that grew the extremely susceptible Alderman and Telephone types in 1935 did not plant these varieties in 1936. This partly accounts for the mildness of mosaic infection in 1936. (New York State Agricultural Experiment Station.)

OCCURRENCE OF PEACH SCAB IN OREGON

S. M. Zeller, of the Oregon Agricultural Experiment Station, sent specimens of peach fruit and leaves affected by the scab organism, Cladosporium carpophilum, with the following report:

"In this one orchard of about 100 trees in Washington County, all the fruit was affected. Varieties attacked included Early and Late Crawford, Muir, J. H. Hale, Elberta, and two unidentified late varieties. Fruit, twigs, and leaves were infected. The orchard was not properly cultivated and had been poorly sprayed. Other orchards in the county where good cultivation is the practice and where a reasonable spray program is followed were seemingly free of scab." (August 24.)

Scab has been reported only spasmodically on various stone fruits, from the Pacific Northwest. This year may have been a favorable season for its development there, since besides this report from Dr. Zeller, it was reported as abundant on sour cherry in Washington, by L. K. Jones in the preceding issue of the Reporter (p. 232).

RASPBERRY DISEASE SITUATION IN THE HUDSON VALLEY, NEW YORK

L. M. Cooley

The principal problem confronting the growers of raspberries in the Hudson Valley district is still that of mosaic control. The main present day varieties are Latham and Chief, both quite resistant to the effects of mosaic infection, and Newburgh, a variety to some extent mosaic-escaping. Minor varieties are Viking, Cayuga, and Adams 87.

All plantings of Viking and Cayuga and the majority of Latham and Chief stocks that were seen appeared completely infected with mosaic. Unmistakable leaf-mottling symptoms were evident on Latham, Viking, and Cayuga, but were less plain on Chief. Mosaic infections in Newburgh ran from none to an estimated 35 percent, with a general range of 5 to 10 percent. The yellow mosaic virus appeared to be responsible for the bulk of infection in all varieties.

The Latham and Chief stocks generally are enduring the effects of mosaic infection, and under good culture are making vigorous growth and producing fair crops of berries regardless. Nevertheless, the superior vigor of the few relatively healthy plantings of these two varieties,

growing under much the same soil, climatic, and cultural conditions, was noticeable.

The chief raspberry mosaic vector aphid, Amphorophora rubi, was unusually abundant, considering the season of the year, on all varieties but Newburgh. A cane-feeding aphid, presumably A. rubicola, was frequently present also.

The prevalence of aphid vectors unquestionably would make raspberry mosaic spread more difficult to control in this district than in other sections of New York State. It is believed, however, that the basic trouble is the extreme abundance of cultivated infection sources, particularly in one community near the village of Marlboro. For wherever plantings were found that had been set with healthy, non-local stock originally and were well isolated from disease sources, they invariably had a low mosaic content. Experimental test plantings are projected to study mosaic spread and mosaic effects under various conditions.

One other disease, powdery mildew (Sphaerotheca humuli), is economically serious on Latham plants all over the Valley. Since sulfur products cannot be used on raspberry foliage because of injury, investigations to find a milder fungicide that will curb mildew spread are considered necessary. (New York State Agricultural Experiment Station, August 14.)

FIRST REPORT OF VERTICILLIUM WILT OF STRAWBERRIES FROM OREGON

S. M. Zeller and L. E. Weaver

Several rows of hybrid strawberries on an Oregon Experiment Station farm were discovered by George F. Waldo to be wilting in land where Plum Farmer black raspberries had been grubbed two years before. The raspberries had suffered severely from Verticillium wilt and the wilting strawberries were confined to that portion of the land where the raspberries had previously been. Cultures made from the crowns of wilted strawberry plants yielded Verticillium of two types such as illustrated by Wollenweber (Die Wirtelpilz-Welkekrankheit von Ulme, Ahorn und Linde usw., p. 284). The Verticillium albo-atrum type predominated but one form very similar to V. cinerescens Wr. was also present.

The wilt symptoms were just as described by Thomas (Calif. Agr. Exp. Sta. Bul. 530, 1932) even to the relatively few small islands of necrotic tissue in the fleshy portion of the crown.

This is the first observation of Verticillium wilt of strawberry from Oregon. (Oregon Agricultural Experiment Station.)

HOP DISEASE SURVEY IN NEW YORK, 1936

R. O. Magie

Nineteen hop yards in Oneida County have been surveyed for diseases during the present season. Downy mildew (Pseudoperonospora humuli) in the form of "basal spikes" was very prevalent in all yards seen or heard from early in the spring. No "spikes" were found after the middle of June. Some leaf infection was apparent early in June in all these yards. Leaf infection was retarded by the dry weather. None was found after the first week in July.

Powdery mildew (Sphaerotheca humuli) infection was first found on July 15. By the second week in August, scattered infection was found in less than half of the yards. Powdery mildew is a very minor factor in hop production so far this year.

All yards over a year in age have approximately 15 to 90 percent of the plants affected by a diseased condition, the identity of which is as yet obscure. The symptoms, which vary according to variety, culture and development of the plant, seem to be attributable to a virus disease. Ten to 30 percent of the plants in many yards are so seriously diseased that few or no hops will be picked from them. Mildly affected plants bear fewer hop cones and sometimes distinctly smaller cones than apparently healthy plants.

Leaf hoppers have been no more severe on hops this year than usual. No visible injury can be attributed to them. The aphis infestation has been very light so far. These insects are regarded as possible vectors of the virus disease. (New York State Agricultural Experiment Station, August 14.)

MISCELLANEOUS NOTES ON PLANT DISEASES IN MISSISSIPPI

Paul R. Miller

CRAPEMYRTLE: Powdery mildew (Erysiphe lagerstroemiae) was very abundant on practically all plantings observed.

JERUSALEM ARTICHOKE: Stem-rot (Sclerotium rolfsii) was found on 20 percent of the plants in a half-acre field.

PEANUT: Stem-rot (Sclerotium rolfsii) was observed on 10 percent of the plants in one three-acre field. It was noticed generally in all fields examined.

YOUNGBERRY: Leaf spot (Cercospora rubi) was observed to be abundant in commercial plantings in the Coast region and also near Jackson. Anthracnose (Elsinoe veneta) was found on the young canes.

TUNG OIL TREE: Numerous trees in commercial plantings of south Mississippi were observed to be dead or dying. The sap wood near the ground line was discolored. In some cases the trees put out their leaves this spring, bore a full crop of nuts, and then wilted. (Division of Mycology and Disease Survey.)

STATUS OF THE DUTCH ELM DISEASE

R. P. White

(Extracts from address made before the Annual Convention of the National Association of Gardeners at Newark, New Jersey, August 18, 1936.)

No difficulty in eradicating the Dutch elm disease from the several points outside the main infected area is anticipated, due to the fact that in none of these areas are insect vectors present in large numbers except in the Old Lyme, Connecticut, area where six trees have been found and where the native elm bark beetle is abundant. Here an extensive sanitation program about these trees has been completed with apparent success.

However, last year over twice as many trees were located at Cleveland than had been found during the previous five years. An extensive sanitation project in this area was complated last fall and up to the present time no further diseased trees have been noted. In spite of the absence of the European elm bark beetles at Indianapolis, nineteen additional diseased trees have recently been found, four miles from the previously destroyed fourteen trees in that city. The explanation for this spread is conjecture at the present moment. If it means another native or imported insect capable of transmitting the disease, or wind dissemination of spores of the fungus, the ultimate success of the project may be further delaved and the situation is certainly complicated. A sanitation project similar to that conducted in Cleveland is now under way in Indianapolis.

Within the main problem area covering parts of New Jersey, New York, and Connecticut, with New York City in the approximate center, there are 25 million elms of all sizes, conditions, and values. Approximately half of these are small seedlings or sprouts, brush elms, or elms growing in swamps with no real estate or timber value. Half of the remainder are

represented as field and woods elms with fuel wood value only. There remain approximately 6 million trees fifteen feet or over in height that must be classed as shade or ornamental trees of considerable real estate and aesthetic value.

During the year 1933, only a limited amount of work could be accomplished due to the lateness of season when the work was initiated and the limited amount of funds available. The extent of the infected area and the severity of the disease within the then known limits, could not be anticipated. In 1934, the general limits of the infected area were pretty well defined by careful scouting. Eradication of diseased trees, although not as promptly done as desired, was more efficient than in 1933. In 1935, starting July 1, a more nearly adequate force of scouts and eradication crews was for the first time available and both scouting and eradication progressed more closely on schedule. This year again, a more nearly adequate force of workers is available and many of them have had the experience of previous years' work which is making for increased efficiency.

Scouting for diseased trees by ground crews has resulted in the location, up to August 8 of this year, of 5,069 diseased trees as compared to 6,450 diseased trees during 1935. Additional findings this month will probably raise the total diseased trees found in 1936 to a figure not far from that of 1935. In other words, in the area as a whole it is anticipated that approximately as many diseased trees will be found this year as were found and destroyed in 1935. In New York State, a sizable reduction in the number of diseased trees will be shown this year, but in lower Westchester County, where a supposedly adequate program of eradication and sanitation work as been conducted for two successive years, an increase in the incidence of disease is anticipated at the conclusion of scouting this season.

Connecticut will show practically a status quo in 1936 as compared to 1935, and, from present indications, New Jersey will show an increase in number of diseased trees. Such a situation is readily explainable as due to inadequate scouting in previous years and to a lag in the sanitation program due to lack of sufficient funds at periods when most needed for effective work.

During the winters of 1934-35 and 1935-36, an extensive sanitation program was undertaken to remove from this area all dead and dying trees which might harbor the fungus or beetle. The great majority of such dead and dying trees existed in the wild, with no value except as fuel. In certain sample plots as high as 21 percent of these trees were found to be harboring the fungus which causes the disease, and a high

percentage were infested with the smaller European elm bark beetle.

Up to the present time over one million, three hundred thousand dead and dying elms of no value have been destroyed and with them, a tremendous back-log of disease and insect vectors. It is estimated that close to another million of such trees are still to be destroyed, before the sanitation project will be up to date. In other words, this removal of dead and dying trees which may or may not be infected and infested with known insect carriers is not much over half completed.

Up to this season, all scouting for diseased trees has been done on foot by trained crews of varying sizes, depending upon the type of terrain to be covered. There are approximately 2500 square miles of territory in a so-called marginal zone, in which the disease is known to exist, but in very limited amounts. This area is rural territory, and to scout this vast area adequately by ground crews is a task which would require a greatly increased force of trained men. The problem has been solved by air-scouting. An auto-giro is used which travels at the rate of approximately 24 miles per hour, carrying a pilot and observer. The observer has before him aerial maps of the territory, and as a yellow flag in an elm or a wilted branch is noted, a pin hole is made in the map. This map is turned over to ground crews at the end of the flight, and these crews then locate the tree and sample it. By this means over 250 suspected trees have been spotted, and the ground crews have had no difficulty in locating the suspected individual tree from the aerial observers' maps. Three-quarters of this territory of roughly 2500 square miles has been scouted from the air and of the 250 or more suspected trees, five have proved to be infected with the disease; five trees which could not otherwise be located with the present force of scouts.

It has been suggested that the present eradication project may be able to reduce the incidence of the disease in this heavily infected territory to a certain minimum, below which further reductions would be impossible. If this theoretical minimum should be reached, then the problem resolves itself into one of many isolated, small areas. From the experience gained in the outlying areas these can then be handled as sanitation areas, and in such places a thorough and prompt sanitation project should result in complete eradication.

That this possibility has practical applications is borne out by data collected in New York State in 1935 and 1936. Twenty-four such isolated areas, involving twenty-six trees, have been treated as experimental areas to determine the practicability of complete eradication, provided the disease can be reduced to a status of scattered trees or scattered groups of trees.

These isolated trees were removed promptly upon confirmation and before any beetles could have matured and departed. In addition to this, every elm within 500 feet of these isolated diseased trees was thoroughly pruned to eliminate all dead wood in which other infective beetles might be breeding. Of six such cases so handled in 1934 and eighteen in 1935, not a recurrence of disease has been found, which could be traceable to the original infected tree. Such information is extremely promising and indicates the work plan to be followed in the future, provided such a condition can be approached.

The Dutch elm disease project is aimed at immediate control and eventual eradication of this disease from the United States. That control or a check in the spread of the disease has been accomplished in certain portions of the area, is borne out by the findings of field scouts in 1936. An annual increase in number of diseased trees of from three to five times could be expected provided no attempt to control or eradicate had been undertaken. That approximately the same number of diseased trees are being found this year in the entire territory, indicates that the disease has been checked. The reduction of diseased trees in New York State is distinctly promising, in spite of an expected increase in lower Westchester and possibly in Rockland counties.

In 1930, the writer made the statement that it was likely that a certain portion of the elm population of the United States would be more resistant to the disease than the remainder. There is no experimental proof of this hypothesis and all the American elms which have been artificially inoculated have proven susceptible. However, these number only in the hundreds, while thousands have been exposed in nature to infection. It may be possible that the reduction shown in the urban areas about New York City means that the most susceptible portion of this elm population has succumbed and that the more resistant individuals are now struggling with infection and may survive.

On the other hand, it may mean that the first severe wave of infection has passed over, that all diseased trees infected previous to the initiation of the eradication project have been removed, and for the first time since the inception of the project we have caught up with the annual disease expectations.

The writer ventures to express the opinion that local control may be possible and feasible in urban areas, at reasonable expense even within the heavily infected zone, provided local authorities charged with shade tree care are cognizant of the risk involved. This possibility is supported by the very evident improvement in urban areas, both in New York and New Jersey where prompt eradication of diseased trees has been accomplished and where the elms have been pruned of dead wood attractive to beetles. (New Jersey Agricultural Experiment Station Department Plant Pathology. Nursery Disease Notes, vol. 9, no. 2. Aug. 1936.)

DUTCH ELM DISEASE ERADICATION

The infected zone for Dutch elm disease has been further extended by confirmation of the disease on elm trees in Little Silver, Fair Haven, and Holmdel, Monmouth County; township of Hopewell, Mercer County; Goshen township, Orange County; New Jersey and Huntington, Suffork County; Minisink, Orange County, New York. Of the three confirmations in Monmouth County, New Jersey, one constituted the first confirmation of a nursery elm. The number of confirmed and removed trees, as shown by weekly reports of the Bureau of Entomology and Plant Quarantine from August 2 to September 5 inclusive are as follows:

	Connecticut	New Jersey	New York	Outside	Total
August 2 to September 5					
Trees confirmed	29	1,657	368	0	2,054
Trees removed	20	2,117	592	11	2,740
Total to September 5					
Trees confirmed	228	14,180	6,323	77	20,808
Trees removed	226	13,066	6,207	77	19,576

AUGUST WEATHER

The accompanying maps, Figures 44 and 45, and discussion of weather during August are taken from the U. S. Weather Bureau Weekly Weather and Crop Bulletin for the week ending September 8, 1936:

August, like the preceding month, was hot and dry. Figure 44 shows that only limited portions of Texas and Florida, and northern New England, were cooler than normal; elsewhere temperatures were 2° to 8° above the August average. Maxima of 100° or higher were reported over a large area reaching from Winnipeg, Man., and Havre, Mont., southward to the Gulf States, and in most States from West Virginia westward. August 10 was the hottest day in Oklahoma's history, with an average maximum of 114°. Records were broken in several other States, including Texas, Arkansas, Missouri, and Iowa. At Oklahoma City, Oklahoma, there were 22 consecutive days with maxima of 100° or more; at Wichita, Kansas, 20; at Fort Smith, Arkansas, 16, and at St. Louis, Missouri, 13 days. The highest maximum reported by a first-order station was 116° at Concordia, Kansas, on the 12th, while 114° was reached at Fort Smith, Arkansas, and Oklahoma City, Oklahoma. In contrast, light frosts occurred during the month in Oregon, Montana, and Aroostook County, Maine.

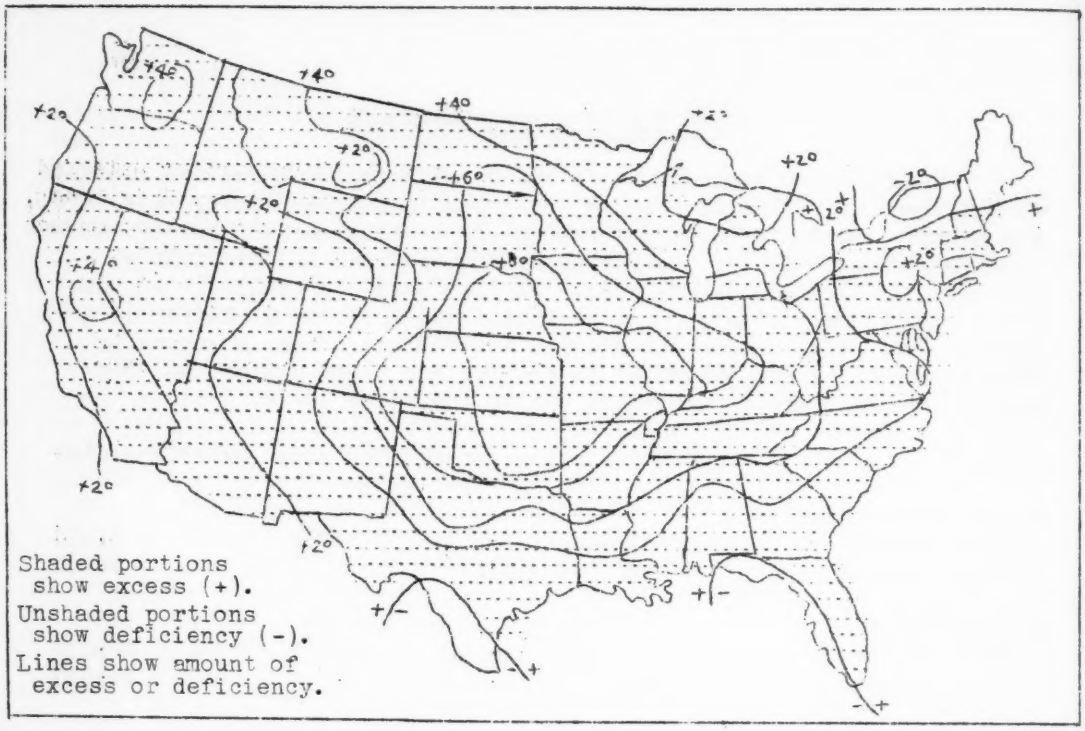

Figure 44. Departure of Mean Temperature from the Noraml for August 1936.

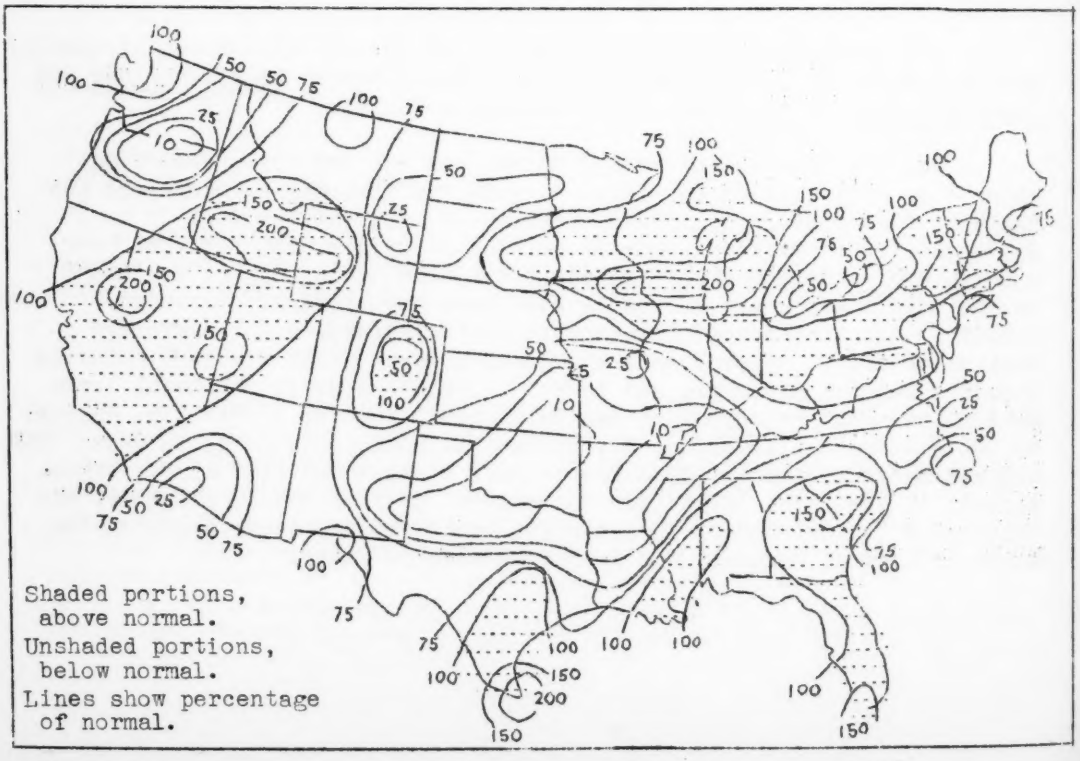

Figure 45. Percentage of Normal Precipitation for August 1936.

Figure 45 gives the percentage of normal precipitation for the month. Several marginal areas, portions of Colorado, much of the Great Basin and Plateau region, and portions of the upper Mississippi and Ohio Valleys and Lake region had above normal rain, but over more than half the country amounts were markedly deficient--in large central and western areas amounting to 10 percent or less of normal.

Comparison of this chart with that for August 1934 shows that the month just ended was considerably drier over much of the interior of the country. For example, most of Oklahoma had 150 to 200 percent of normal rain in August 1934, while this year the totals were from 10 to 25 percent. Similar conditions prevailed in portions of Nebraska, Missouri, portions of the Ohio Valley, the Southeast, and much of the Southwest.

RAINFALL DURING SUMMER AND EARLY SEPTEMBER

September started with saving rains in many grain states left extremely dry by the three-month drought. Widespread rainfall the first 10 days of this month were specially beneficial in the Lake region and in the Mississippi and Ohio Valley States, according to J. B. Kincer of the Weather Bureau (See Figure 46). They brought only partial relief in most of the Plains states, with good rains, however, in Kansas, extreme western Oklahoma, and northwestern Texas. These rains came too late to improve the corn crop materially, Mr. Kincer says, but they were of great value in conditioning the soil for plowing and fall seeding and for fall forage crops that may be pastured. A large southwestern area, including northern Texas, eastern Oklahoma, and western Arkansas, continued dry.

The passing of August brought to a close one of the most disastrous crop seasons in the history of the interior United States. Much of the heart of the agricultural section of the country--that part lying between the Appalachian and Rocky Mountains--had an unprecedently hot, dry summer, with rainfall less than half normal over a wide territory (See Figure 47.) The drought centered in Missouri, Kansas, and Oklahoma, where, in many places, temperatures broke their past high records and rainfall was less than one-third normal for the 3 summer months. States from the Rocky Mountains westward, on the other hand, had more than normal rainfall. Growing conditions there were unusually favorable. In many parts of the more eastern states there was some lack of rain, but the summer drought there was not severe generally.

The summer of 1936 was the driest of record in Illinois, Missouri, Oklahoma, Kansas, Nebraska, and the Dakotas. While previous dry records were not broken, Indiana, Wisconsin, Minnesota, Iowa, and Arkansas had less rain this summer than in the summer of 1934. (From U. S. Dept. Agr. Press Release.)

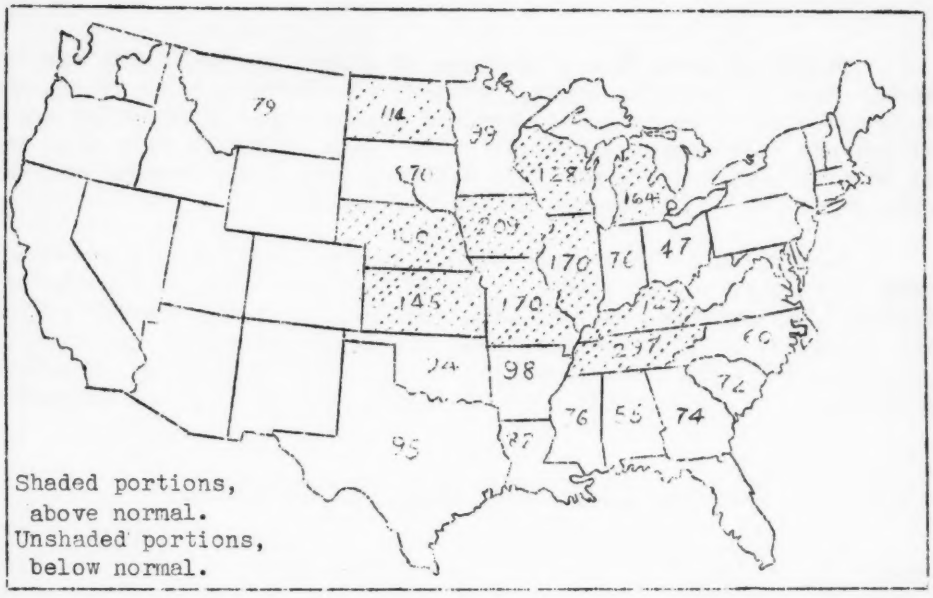

Figure 46. Rainfall in grain and cotton states September 1-9 inclusive 1936. (Percentage of normal.)

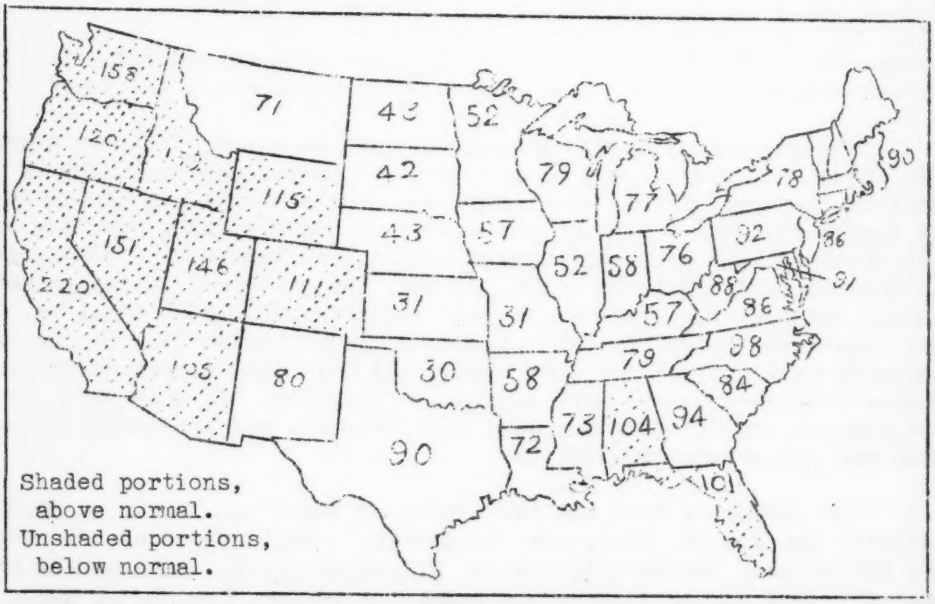

Figure 47. Percentage of normal rainfall for the summer (June-August), 1936.